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ABSTRACT

A summative evaluation study of the National Dairy Council's learning system, "Food...Your Choice," was designed to address three concerns: (1) effectiveness of the learning system in enhancing elementary school students' understanding of nutrition; (2) effect of instruction in nutrition on student attitudes about nutrition and student behavior in relation to food choices; and (3) effect of a new curriculum upon the ongoing instruction program in the schools. Results indicated that the curriculum did significantly increase students' nutrition knowledge. Also, students chose more nutritious snacks and ate more nutritious foods at lunch. Finally, the learning environment, as perceived by students, did not appear to be changed by the curriculum. (JH)

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FOOD...YOUR CHOICE, LEVELS 1, 2 AND 3
SUMMATIVE EVALUATION

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FOOD...YOUR CHOICE, LEVELS 1, 2 AND 3: SUMMATIVE EVALUATION

Background and Purpose

In response to a pressing need for sequentially developed nutrition education materials in our nation's schools, the National Dairy Council (NDC) has developed a comprehensive nutrition learning system for kindergarten through sixth grades, FOOD...Your Choice (FYC). The learning system is divided into three levels, each of which contains from two to four units of instruction. Each of these units includes several learning activities.

This system is based upon findings of a needs assessment study,¹ an analysis of existing curriculum guides and materials,^{2,3} and the conceptual framework for nutrition education in the schools as set forth by the 1969 White House Conference on Food, Nutrition and Health.⁴ Prototype materials were developed by NDC staff and a large group of consultants from various agencies and educational institutions. NDC then underwrote an extensive field test of these prototype materials⁵ and worked with affiliated Dairy Council units (ADCU) throughout the United States to disseminate the curriculum to local schools. An external group, the Office of Evaluation Research (OER) at the Chicago Circle campus, University of Illinois was contracted to conduct an evaluation of the materials in final printed form. The findings of this Summative Evaluation Study, conducted in the 1977-78 school year, are presented in this report by OER.⁶

The Summative Evaluation of FYC was designed to answer three questions: effectiveness of FYC in enhancing students' understanding of nutrition, effect of instruction in nutrition on student attitudes about nutrition and student behaviors in relation to food choices, and effect of a new curriculum upon the ongoing instructional program in the schools. The study was designed to yield data that could be generalized beyond the elementary schools selected for the study.

Design of the Summative Evaluation

Sites and Subjects

Five public school elementary districts were selected to give the study a wide geographic representation in the United States. The five sites included one each in the northwestern, southeastern, midwestern, north central and western United States. Four elementary schools at each site participated in the study. The schools within and among the sites represented differing school and classroom organizations ranging from open flexible environments to self-contained graded classes, varying levels of dollar-per-pupil support, and a range of socioeconomic communities excluding schools with predominantly very high and very low income families. Other criteria used in selecting sites were the willingness of the school to participate in the study and the accessibility of the school to an ADCU so that a professional staff member of that unit could coordinate the collection and forwarding of data.

At each of the twenty schools, one class in each grade, kindergarten through sixth, participated in the study. With approximately 25 students in each class, the sample included over 140 teachers and approximately 3,500 students.⁷ Care was exercised to preserve the confidentiality of data on all individuals and schools as well as to avoid disruption of the ongoing school practices in collecting data.⁸

Instruction and Achievement Testing

All teachers participating in the Summative Evaluation Study were to avail themselves of in-service training in the implementation of FYC, usually conducted by the ADCU coordinators at their respective sites. Due to last-minute shifts in school personnel, a few teachers did not receive in-service training. The ADCU coordinators received two days of training on the data to be collected. All data were shipped directly to OER for processing, analyzing and reporting. OER staff made site visits, talked informally with participating and nonparticipating teachers, principals, school food service personnel, curriculum coordinators or administrative officers responsible for curriculum, and students.

The teachers were to plan approximately 20 hours of instruction, incorporating the FYC lessons into the ongoing curriculum in a manner agreed upon by the staff in each school. Adjustments in FYC level assignments were made at the respective schools in cases of intergrade grouping of students.

The evaluation research design was developed so that all students participating in the evaluation would be exposed to the curriculum with minimal disruption to the regular classroom operations. The study consisted of two distinct instructional phases. Therefore, at each site the four schools were arbitrarily divided into two groups. One group, consisting of two of the schools, was designated as School A and School B; the other group of two schools was designated as School C and School D. All schools were administered a nutrition achievement test in early fall 1977, Time 1, shortly after the school year began. A and B Schools received instruction between September and December, Phase 1. All schools were again administered the nutrition achievement test, Time 2. The C and D Schools then received FYC instruction after January 1978, Phase 2. The nutrition achievement test was administered a third time to all schools in late March or early April, Time 3. The design thus provided a built-in control group, CD schools, without depriving any students of the opportunity to receive instruction in nutrition.

Instructional Phases 1 and 2 and the three achievement measurement periods are illustrated in the following diagram, Figure 1. Note that achievement measurement Time 2 denotes both the end of Instructional Phase 1 and the beginning of Instructional Phase 2.

Figure 1. Instructional Phases and Achievement Measurement Times for the FYC Summative Evaluation.

	Time 1	Time 2	Time 3
SCHOOLS	PHASE 1 Fall 1977	PHASE 2 Spring 1978	
AB Group	FYC Instruction	Retention	
CD Group	No FYC Instruction	FYC Instruction	
	Time 1	Time 2	Time 3

Students in the seven different grade levels received instruction in selected units within the appropriate level of curriculum. Table 1. shows this part of the summative evaluation design.

Table 1. Levels and Units of FYC Instruction Completed by Grades.

<u>Grade</u>	<u>FYC Instruction</u>
K	Level 1, Units 1 and 2
1	Level 1, Units 2 and 3
2	Level 1, Units 3 and 4
3	Level 2, Units 1 and 2
4	Level 2, Units 1 and 3
5	Level 3, Unit 1
6	Level 3, Unit 2

Collection of Data

Several types of data were collected to obtain the maximum amount of information on the three major curriculum questions stated on page 2. Tests, questionnaires, structured classroom observations, semi-structured interview schedules, informal recorded dialogue with principals and other school associated personnel, and logs constituted the types of data. The data sources included students, teachers, principals, designated school personnel who served as site leaders, parents, and ADCU coordinators. Table 2. presents an overview of the portion of the summative evaluation design which deals with instruments and data sources. Each instrument is described in more detail in the following text.

Table 2. Instruments and Data Sources Used in FYC Summative Evaluation

Instruments	Data Source	Collection Time	Purpose
Nutrition Achievement Tests: Levels 1,2 and 3	Students	Time 1, 2, 3	To measure changes in nutrition scores over time and before and after treatment
My Class Inventory	Students	Time 1 (AB) Time 2 (AB, CD) Time 3 (CD)	To measure changes in learning environment as perceived during curriculum implementation by students
Classroom Observation Schedule	Students Teachers	During Phase 1 (AB) During Phase 2 (CD)	To observe how FYC is implemented in the classroom and to observe students' reactions to FYC.
Teacher Interview Schedule	Teachers	After Phase 1 (AB) After Phase 2 (CD)	To identify teacher concerns, suggestions and reactions to FYC following the completion of implementation
Instructional Log	Teachers	Throughout study	To measure teacher reactions to each FYC activity; to maintain a time log
Research Log	ADCU Coordinators	Throughout study	To document the frequency and content of contacts between ADCU coordinators and teachers
Team Leader Interview Schedule	Team Leader	After Phase 2	To obtain a general overview of team leader impressions of FYC and the schools
Episode Record	Teachers Parents Coordinators Principals	Throughout study	To gather informal, unsolicited reactions to FYC

Nutrition Achievement Test. The primary purpose of the multiple choice achievement tests developed at each of the three levels was to measure students' gain in knowledge about nutrition after instruction in FYC as reflected in their test scores. The test items were developed by NDC to reflect content covered by the concepts identified at the 1969 White House Conference on Food, Nutrition and Health.⁴

The Level 1 instrument uses pictures to depict the choices for each multiple choice item; Level 2 and Level 3 instruments are in word form. The tests were administered by the classroom teachers. Items within each of the three tests related to specific units within each level of the curriculum. Students were tested over only those test items relating to the units of the curriculum to which they were exposed or to units within the level which preceded those on which they received direct instruction. For example, the kindergarteners were administered Items 1-20 on the Level 1 test, these items relating to the White House concepts receiving attention in Units 1 and 2 of the FYC curriculum, Level 1. First graders completed items 1 through 30, these items relating to the concepts for Units 2 and 3 on which they received instruction and for Unit 1 on which they did not receive instruction. An exception to this procedure was Level 3's test, where the two grades completed only the items for the unit on which they received instruction.

By measuring students' nutrition achievement at the beginning of the first instructional phase, Time 1, at the end of the first instructional phase, Time 2, and again at the end of the second instructional phase, Time 3, it was possible to make ten types of comparisons on nutrition education achievement. The types of comparison and a description of what can be learned from each of these components of the overall summative evaluation design are summarized in Table 3.

My Class Inventory. The My Class Inventory is an instrument used in over 500 studies throughout the United States and translated for use in many European countries, India and Japan.⁹ Its purpose is to gather information about childrens' perceptions of their learning environment. It includes five scales: Cohesiveness, Competitiveness, Difficulty, Friction, and Satisfaction. Two cognitive scales were added to ascertain student perceptions of the higher and lower thought processes of the learning activities.¹⁰

The My Class Inventory was administered before the FYC Program began (pretest) and again at the time the program was completed (post-test). The My Class Inventory post-test was administered immediately after the last FYC class. The classroom teacher administered the inventory. For grades 1, 2 and 3, the teacher read the question aloud as the children responded and marked it. Kindergarten children were not administered the inventory.

Table 3. Focus and Purpose of Ten Types of Comparisons Made Using Nutrition Achievement Test Scores Before and After Instruction.

<u>Comparison</u>	<u>Focus</u>	<u>Purpose</u>
A. AB to CD	Time 1	Comparison of initial scores between groups
B. Time 1 to Time 2	AB Schools	Comparison of scores for one group before and after instruction
C. Time 1 to Time 2	CD Schools	Comparison of scores for one group over time with no FYC instruction (indication of maturation, additional exposure to school, etc.)
D. AB to CD	Time 2	Comparison of scores for group with instruction to scores for group with no instruction
E. Time 2 to Time 3	AB Schools	Comparison of scores immediately after instruction to scores three months after instruction (retention) for one group
F. Time 2 to Time 3	CD Schools	Comparison of scores for one group before and after instruction
G. AB to CD	Time 3	Comparison of termination scores between groups
H. AB-Time 1 to CD-Time 2 (Pretest)	AB/CD Schools	Comparison of scores between groups immediately prior to receiving instruction
I. AB-Time 2 to CD-Time 3 (Post-test)	AB/CD Schools	Comparison of scores between groups immediately after receiving instruction
J. ABCD Pretest (H) to ABCD Post-test(I)	ABCD Schools	Comparison of scores for both groups immediately before and immediately after instruction

Classroom Observation Schedule. The purpose of the observation was for ADCU coordinators to secure information about the use of the FYC curriculum as they saw it being implemented by teachers and students in the classrooms and the observed effects of implementation on the ongoing classroom practices. The ADCU coordinators were trained in observation techniques and in the use of the Classroom Observation Schedule by OER personnel. Each ADCU coordinator reviewed the Observation Schedule and became thoroughly familiar with it. These coordinators focused on five major points during the observation: orientation, instructional materials, learning activities, teacher and teaching characteristics, and observer's personal assessments. Each coordinator reviewed the learning activities in advance to become familiar with them.

Many classes were observed three times, once before the FYC session started, and twice during the FYC sessions. Due to an extremely difficult winter in some areas of the United States, some classes were observed only once.

Teacher Interview Schedule. The Teacher Interview Schedule was developed to elicit data from the teachers about the various FYC materials and supporting services (inservice preparation and specially prepared materials for teachers to use in developing the lessons). The interview also asked questions concerning the curriculum's organization, unit evaluations, role of FYC in the larger curriculum, questions on specific activities, teacher's perception of changes in students' nutrition attitude and food choices, and expenses incurred in implementing the program. The interviews were conducted by ADCU coordinators at the end of the program.

Instructional Log. The purpose of the Instructional Log was to provide the teacher with an easy-to-use form for recording the extent of usefulness of the various materials (e.g., Primer, Resource Materials, Student Activity Sheets, and Evaluations), the amount of preparation, teaching and homework time for each activity, and suggestions for change. The teachers were to make the notations following each activity.

Research Log. The ADCU coordinators maintained a Research Log on each class. The log provided the ADCU coordinators with a specified place for recording details of any observations not recorded elsewhere. Records were kept of any information that might help interpret the field test results. Such items as telephone calls, personal visits, observations in addition to the formal classroom observations, problems encountered, suggestions from school personnel and other information deemed important formed the body of the logs kept by the ADCU coordinator.

Team Leader Interview Schedule. The purpose of this Schedule was to obtain a systematic review of the nutrition curriculum as perceived by the person at the school site designated as Team Leader, and to secure her/his reactions to implementation and suggestions for further development. The debriefing interview of approximately 60 minutes in length was carried out within a few days of the last nutrition session by the ADCU coordinator.

Episode Record. The purpose of this record was to gather informal, unsolicited reactions to FYC from a variety of sources. This record was maintained by ADCU personnel. Data was gathered primarily during site visits and after telephone conversations, and from logs.

Analysis of Data

Data were analyzed using appropriate descriptive and inferential statistics. Procedures applicable to each of the data types are discussed below.

Nurition achievement. T-tests were used to compare achievement as reflected by the Nutrition Achievement Test scores by group and between groups at different comparison points. Figure 4 summarizes the ten types of comparisons and the purpose of each. From an analysis of these test scores, it is possible to report on achievement gains with and without instruction in FYC, differences in achievement due to time of year FYC was introduced, and the extent of retention of nutrition knowledge some time after exposure to FYC.

Although t-tests provided valuable information about student performance, a more stringent test of gains over time for both groups and of gains between group AB and CD was obtained through regression analysis, a statistical procedure for examining the effects of defined independent variables on the dependent variable, post-test achievement. In this study the independent variables included pretest score, site, sex, ability level of students as identified by a teacher rating, and group. After removing the effects of these independent variables on post-test achievement scores, we can study the effect of instruction in FYC on achievement without confounding the findings by these other variables.

All achievement data for each of the seven grades, K-6 were analyzed separately by unit within each of the respective level's achievement test. Data were also analyzed by total test score.

Learning environment. Students' perceptions of their classroom learning environment before and after FYC instruction as reflected by their responses on the My Class Inventory were examined using both the t-test and regression analysis. The general conduct and attitude of students in the classroom were also examined by comparing data from Classroom Observation Schedules completed early in the implementation of FYC with data obtained near the end of the instructional program.

Nutrition attitudes and food choice behaviors. Tabulation of teachers' responses on Teacher Interview Schedules to changes in students' attitudes toward nutrition and food choices provided a partial description of changed attitudes and food behaviors. Further data was tabulated from the Episode Reports.

Classroom procedures. Possible changes in classroom procedures due to FYC were determined by analysis of responses to various items on the Teacher Interview Schedule. By means of frequency tabulations of responses, a description could be drawn of the ways FYC was integrated into the curriculum. Descriptions of the effectiveness of the materials, time required to implement the lessons, and specific strengths and weaknesses of the learning activities were developed from several data sources. These sources were frequency tabulations of responses on the Instructional Log maintained by the teachers, on the Team Leader Interview Schedules, and on the Research Logs.

Findings and Conclusions

The Summative Evaluation of FYC was designed to answer three questions: effectiveness of FYC in enhancing students' understanding of nutrition, effect of instruction in nutrition on student attitudes about nutrition and student behaviors in relation to food choices, and effect of a new curriculum upon the ongoing instructional program in the schools. The study was designed to yield data that could be generalized beyond the elementary schools selected for the study.

Nutrition Achievement

T-test analysis. The simplest test of gain is to use t-test procedures to compare pretest scores with post-test scores (see page 10, Table 3, Lines B and F). Table 4 presents the significance level of these comparisons for the AB and CD schools by level and unit of FYC for each grade, K-6. Significance gains as reflected by achievement test scores are found for all grades for both AB and CD schools on all unit tests and on the total test scores for each grade with the exception of Level 2, Unit 2 scores for grade 3, AB schools only and Level 2, Unit 3 scores for grade 4, CD schools only. Significance at 0.001 level indicates that the probability of a difference this large occurring by chance is one in a thousand. These t-test analyses lead us to conclude that during the time of the study participants profited from FYC instruction; they made significant gains in nutrition knowledge as reflected by achievement test scores.

TABLE 4. Significance Level of Differences Between Pretest and Post-Test Scores on Nutrition Achievement Tests as Determined by t-Test Analysis.^a

<u>LEVEL 1</u>										
<u>Grade</u>	<u>Unit 1</u>		<u>Unit 2</u>		<u>Unit 3</u>		<u>Unit 4</u>		<u>Total Test</u>	
	<u>AB</u>	<u>CD</u>	<u>AB</u>	<u>CD</u>	<u>AB</u>	<u>CD</u>	<u>AB</u>	<u>CD</u>	<u>AB</u>	<u>CD</u>
K	.001	.001	.001	.001					.001	.001
1	.001 ^b	.001 ^b	.001	.001	.001	.001			.001	.001
2	.001 ^b	.001 ^b	.001 ^b	.001 ^b	.001	.001	.001	.001	.001	.001
 <u>LEVEL 2</u>										
3	.001	.001	NS	.01					.001	.001
4	.001	.001	.05 ^b	.05 ^b	.001	NS			.001	.001
 <u>LEVEL 3</u>										
5	.05	.001								
6			.001	.001						

^a Refer to Table 2, p. 7, for an indication of levels and units completed by each grade.

^b These students were tested over instructional units which preceded those on which they were given direct instruction.

Regression analysis: with and without instruction. While the above analysis indicates gains in nutrition achievement, it does not take into account the role that variables other than FYC instruction, such as level of prior nutrition information (size of pretest score), maturation,

TABLE 4. Significance Level of Differences Between Pretest and Post-Test Scores on Nutrition Achievement Tests as Determined by t-Test Analysis.^a

LEVEL 1										
Grade	Unit 1		Unit 2		Unit 3		Unit 4		Total Test	
	AB	CD	AB	CD	AB	CD	AB	CD	AB	CD
K	.001	.001	.001	.001					.001	.001
1	.001 ^b	.001 ^b	.001	.001	.001	.001			.001	.001
2	.001 ^b	.001 ^b	.001 ^b	.001 ^b	.001	.001	.001	.001	.001	.001
LEVEL 2										
3	.001	.001	NS	.01					.001	.001
4	.001	.001	.05 ^b	.05 ^b	.001	NS			.001	.001
LEVEL 3										
5	.05	.001								
6			.001	.001						

^a Refer to Table 2, p. 7, for an indication of levels and units completed by each grade.

^b These students were tested over instructional units which preceded those on which they were given direct instruction.

Regression analysis: with and without instruction. While the above analysis indicates gains in nutrition achievement, it does not take into account the role that variables other than FYC instruction, such as level of prior nutrition information (size of pretest score), maturation,

site, sex and ability level of students as identified by teacher rating, might play in obtaining these gains. Therefore, regression equations which controlled for these independent variables were set up to more rigorously examine the changes from Time 1 to Time 2 for AB schools receiving FYC instruction and CD schools not receiving FYC instruction. Table 5 presents the significance level of these comparisons.

TABLE 5. Significance Level of Differences Between Test Scores for AB Schools and CD Schools at Time 2 When the Variables of Prior Knowledge, Maturation, Site, Sex and Ability Level Are Controlled (Regression Analysis).

LEVEL 1

<u>Grade</u>	<u>Unit 1</u>	<u>Unit 2</u>	<u>Unit 3</u>	<u>Unit 4</u>	<u>Total Test</u>
K	.001	.001			.001
1	.001 ^a	.001	.001		.001
2	NS ^a	.001 ^a	.001	.001	.001

LEVEL 2

3	.001	NS			.001
4	.05	NS ^a	NS		NS

LEVEL 3

5	NS	
6		.001

^a These students were tested over instructional units which preceded those on which they were given direct instruction.

site, sex and ability level of students as identified by teacher rating, might play in obtaining these gains. Therefore, regression equations which controlled for these independent variables were set up to more rigorously examine the changes from Time 1 to Time 2 for AB schools receiving FYC instruction and CD schools not receiving FYC instruction. Table 5 presents the significance level of these comparisons.

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<u>Grade</u>	<u>Unit 1</u>	<u>Unit 2</u>	<u>Unit 3</u>	<u>Unit 4</u>	<u>Total Test</u>
K	.001	.001			.001
1	.001 ^a	.001	.001		.001
2	NS ^a	.001 ^a	.001	.001	.001

LEVEL 2

3	.001	NS			.001
4	.05	NS ^a	NS		NS

LEVEL 3

5	NS				
6		.001			

^a These students were tested over instructional units which preceded those on which they were given direct instruction.

For Level 1, all grades using the FYC curriculum (AB) obtained significantly higher scores than grades not using FYC (CD) on the nutrition achievement test items related to units in which they received instruction and on the total test. In addition, some achievement carry-over into units preceding those for which AB schools received instruction was found; grade 1 students made gains in achievement related to the Unit 1 test items and grade 2 students made gains related to the Unit 2 test items.

For Level 2, all schools using the FYC curriculum scored significantly higher than schools not using FYC on the Unit 1 nutrition achievement test items. However, grade 3 students showed an insignificant gain on the Unit 2 test items and grade 4 students showed an insignificant gain on the Unit 3 test items. Significant gains for grade 4 on the Unit 1 test items did not carry over to the Unit 2 test items, a unit on which no instruction was given.

For Level 3, the sixth grade, AB schools showed significantly higher achievement gains than did CD schools on the Unit 2 achievement test items. However, grade 5, AB schools did not make significantly higher gain scores after instruction than did CD students before instruction on the Unit 1 achievement test items. This implies some implementation difficulties in the AB schools, especially at two of the four sites.

Looking at the overall results, these regression analyses lead us to conclude that the FYC curriculum is functioning well in improving students' knowledge of nutrition concepts as reflected by achievement

test scores. Students who are receiving instruction in FYC are, for the most part, making significant gains in nutrition achievement above and beyond those that might be expected due to prior nutrition knowledge, maturation, site, sex, and ability level.

Other regression analyses. For all grades, students' prior achievement significantly predicts their later achievement; i.e. Time 1 scores predict Time 2 scores and Time 2 scores predict Time 3 scores. Ability level of students as identified by teacher rating also significantly predicts achievement for most units and total scores by grades; students of higher ability tend to make greater gains in nutrition achievement than those of lower ability. Sex predicts achievement for a few units in a few grades, but not systematically by grade; therefore, we conclude that FYC does not give an advantage to one sex over the other.

By comparing test scores for AB and CD schools between pretest and post-test, holding constant prior achievement, ability level, site, and sex, we examined whether there was an optimal time for FYC instruction. With the exception of kindergarten, there was no systematic difference between AB and CD schools scores from the pretest to the post-test. We conclude that FYC functions equally well at the beginning of the year and at midyear for grades 1-6. However, FYC is more effective for kindergarten students in mid-year rather than at the beginning of the year.

The Time 3 results for AB schools indicate that three months after receiving FYC instruction students are still retaining the material. In several grades, e.g. kindergarten, Units 1 and 2; grade 1, Unit 3;

test scores. Students who are receiving instruction in FYC are, for the most part, making significant gains in nutrition achievement above and beyond those that might be expected due to prior nutrition knowledge, maturation, site, sex, and ability level.

Other regression analyses. For all grades, students' prior achievement significantly predicts their later achievement; i.e. Time 1 scores predict Time 2 scores and Time 2 scores predict Time 3 scores. Ability level of students as identified by teacher rating also significantly predicts achievement for most units and total scores by grades; students of higher ability tend to make greater gains in nutrition achievement than those of lower ability. Sex predicts achievement for a few units in a few grades, but not systematically by grade; therefore, we conclude that FYC does not give an advantage to one sex over the other.

By comparing test scores for AB and CD schools between pretest and post-test, holding constant prior achievement, ability level, site, and sex, we examined whether there was an optimal time for FYC instruction. With the exception of kindergarten, there was no systematic difference between AB and CD schools scores from the pretest to the post-test. We conclude that FYC functions equally well at the beginning of the year and at midyear for grades 1-6. However, FYC is more effective for kindergarten students in mid-year rather than at the beginning of the year.

The Time 3 results for AB schools indicate that three months after receiving FYC instruction students are still retaining the material. In several grades, e.g. kindergarten, Units 1 and 2; grade 1, Unit 3;

grade 2, Units 2 and 3; grade 3, Unit 3; and grade 4, total test score, students continued to gain significantly in nutrition knowledge after instruction was completed. Some of this gain may be attributed to AB teachers continuing the implementation of FYC after Time 2; gain also may be attributed to increased motivation provided by FYC to learn from sources outside the planned school curriculum. No AB Site showed lower achievement scores three months after FYC instruction than immediately following instruction.

Summary. The achievement results discussed in the preceding sections and presented in Tables 1 and 2 indicate:

- . FYC significantly increases students' nutrition knowledge.
- . FYC significantly increases students' nutrition knowledge even when the effects of prior knowledge, maturation, site, sex, and ability level are removed.
- . FYC can be introduced any time during the school year with equally effective achievement gains for grades 1-6; kindergarteners profit more from instruction which begins midyear.
- . In all grades but grade 3, Unit 1, students retain what they have learned over several months' time; in some cases they gain significantly.
- . There appears to be transfer of learning from units in which students receive instruction to units in the same level that precede those in which they receive instruction.
- . When two groups (AB, grade 3, Unit 2 and CD, grade 4, Unit 3) failed to make significant achievement gains from pretest to post-test, their counterpart schools, CD and AB, did make significant pretest to post-test gains. This may indicate that

one-time factors unrelated to FYC instruction, such as weather or school events, were an influence.

Learning Environment

No consistent pattern of change in perceived learning environment as measured by student responses on the My Class Inventory emerged during FYC instruction. Identified changes can usually be attributed to only one or two sites. Regression analyses comparing AB to CD schools indicate no differences between the groups; therefore, the time of FYC implementation does not appear to effect the classroom learning environment. Regression analyses examining the relationship of nutrition achievement to perceptions of the learning environment also found no clear-cut patterns. The only consistent predictor of post-test learning environment is the pretest learning environment, indicating that FYC does not appear to change either positively or negatively the classroom climate. In summary, results on the My Class Inventory indicate that the FYC curriculum had little or no effect on the classroom climate.

Nutrition Attitudes and Food Choice Behaviors

The most difficult goal of any nutrition education program is to help children change behaviors by wanting to select and selecting more nutritious foods. Yet all teachers noted, during the interviews, examples of the effects of FYC on students' attitudes about good nutrition and on observable students' behaviors concerning food choices. Teachers in all grades most often related incidents of students bringing more nutritious snacks to school, electing to have a nutritious food at a

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school party rather than candy, and selecting and eating more nutritious foods at lunch. Students who previously would not consider eating vegetables and fruits not only tasted them during FYC instruction but continued to eat them at lunch. Students were more likely to discuss and evaluate the nutritional value of their lunches and other meals and snacks, to indicate awareness of the value of nutrition education, and to better understand the relationship of foods to growth and health.

Classroom Procedures

Many well-designed curricula fail to hold up in practice due to implementation problems. The curricula can interfere with the accepted instructional practices and make undue demands on teacher preparation time as well as compete for instructional time with other curricular areas. Also, materials developed for the curriculum may not prove as effective in practice as an attractive format may suggest. This section summarizes the effect of FYC on classroom practices across grade levels as gathered from the data collected on the Interview Schedules, Classroom Observation Schedule, and Logs.

Integration into the curriculum. Data was provided from two perspectives on how FYC was integrated into the schools' curricula. The observations of the ADCU Coordinators usually supported information provided by the participating teachers. FYC was most frequently incorporated into three areas: science, health, and language arts.

The ADCU Coordinators reported observing FYC implemented as a free-standing area of study independent of other curricula. None of the teachers mentioned this. The difference may be due to the term "integrate." The observers may not have seen a relationship between a specific FYC activity and the science curriculum, and hence listed the FYC activity as free-standing, although teachers incorporated FYC in the schedule at times generally assigned to science, health or language arts.

In all but one instance teachers fit the existing curriculum around FYC instead of selecting activities from FYC only when they fit an existing curriculum plan. Many nutrition activities were found amenable to integration into the regular time schedule. In many instances, the same teacher substituted FYC activities into several different curricular areas.

Effectiveness of materials. FYC provides spirit masters for making student activity sheets (SAS), resource materials to assist teachers in implementing the activities, and take-home materials. Over half of all teachers rated all FYC materials as suitable to the indicated grade. Responses in the unsuitable category referred only to specific activities within units. One of five reasons was usually given: too difficult for grade level; additional supplies too expensive; too long to prepare and implement; too difficult to obtain materials; or uninteresting.

There was clear consensus on the value of the spirit masters, with 100 percent of teachers in grades 1-5 rating them as useful. Teacher resource materials were rated very highly on all units in all grades

except for Level 2, Unit 2. In commenting on their value, teachers of all grades reported that the Program Overview was clearly presented, teachers Materials were extremely helpful, and the resource materials were valuable. Teachers in grades 2-6 found the nutrition primer more helpful in supplementing their own understanding of nutrition, than did K-1 teachers.

There appears to be no pattern of usage with take-home materials by grade level. Some teachers encouraged the school-home relationship more than others. Parents' positive response to the take-home materials corresponds to the degree to which they were sent home with the students. Teachers made suggestions on additional supporting materials but there is little pattern to the responses. Over a third of the kindergarten and second grade teachers would like to see more activities, games, and songs. There were few suggestions for deletion of materials. Many teachers said nothing should be deleted.

Teachers were asked to list the advantages and disadvantages associated with using FYC units. The most frequent response in each category by grade is shown in Table 6. There are several recurrent advantages perceived by teachers; ease of teaching with the FYC program stands out. It is apparent that teachers across the grades valued the materials, found them helpful, and found FYC easy to implement.

TABLE 6. Advantages and Disadvantages Associated with Using FYC.

<u>Grades</u>	<u>Advantage</u>	<u>Disadvantage</u>
K	Good activities and cooking experience	Over-emphasis on SAS's
1	Easy to teach; increased students' awareness of nutrition	More activities needed for brighter students
2	Easy to teach	More activities needed for brighter students
3	Easy to teach; good activities and cooking experience	Some activities too time consuming
4	Easy to teach; good SAS's	Materials for some activities should be supplied in the system
5	Good activities and cooking experience; increased students' awareness of nutrition	Some activities too time consuming
6	Easy to teach; children made aware of family and individual eating habits; increased students' awareness of nutrition	Some activities unsuited to large group instruction

Time spent. The NDC curriculum developers suggest allowing a maximum of 20 hours of instruction per grade level. As shown in Table 7 none of the grades needed this much time. Teachers in grades 4 and 6 spent more time on FYC instruction than did teachers in the other grades.

TABLE 7. Time Spent in Implementing the FYC Curriculum^a

	Direct Instruction	Teacher Preparation	Student Homework	Total Time by Unit	Total Time by Grade
K: Unit 1	4.8	2.3	.8	7.8	
Unit 2	-----No data-----				
1: Unit 2	5.4	1.7	.9	8.1	
Unit 3	4.3	1.5	.6	6.4	14.4
2: Unit 3	4.9	2.9	1.0	8.8	
Unit 4	3.8	1.2	.6	5.6	14.4
3: Unit 1	7.1	2.9	1.7	11.7	
Unit 2	2.0	.5	.1	2.6	14.3
4: Unit 1	6.6	3.0	1.9	11.4	
Unit 3	4.0	.8	.5	5.3	16.7
5: Unit 1	8.3	3.5	1.9	13.6	13.6
6: Unit 2	10.5	4.0	2.8	17.2	17.2

^aAll times are adjusted for missing data.

Teachers in grade 5 spent the least amount of time on FYC instruction despite the fact that grade 5 teachers reported that some activities in Unit 1 were too difficult and time consuming. Teachers in grade 3 spent about 7 hours of their direct instructional time on Unit 1 and 2 hours on Unit 2. The average teacher preparation time for implementing all assigned units was 3.1 hours.

Nutrition achievement scores may indicate that 20 hours of instruction is not always necessary as evidenced by the excellent post-test performance of grade 6 students with only 17.2 hours of total instructional time. Time variations among classes within grade levels, however, were very great, emphasizing that time suggestions must always be viewed as very loose guidelines. Some teachers spent an inordinate amount of time on a given activity, others devoted minimal time, and a few skipped activities. Teachers were able to extend or reduce an activity to fit the needs of specific classes. But there may be an optimal range of instructional time for each activity. When improved research procedures are available for studying students "engaged" time rather than gross instructional time, more precision in suggested time may then be possible.

Changes in teacher behavior. Teachers responded to three questions concerning change in their own attitudes and behaviors as a result of having used the FYC curriculum. The questions covered teachers' views on the importance of nutrition education, use of outside nutrition materials in the classroom, and their contacts with other teachers about nutrition.

Over half of the teachers viewed nutrition education as a more integral part of their classroom curriculum after using FYC. No teacher felt nutrition education was less important; several teachers who indicated "no change" stated that they felt nutrition education was important before they started using FYC.

The majority of teachers in the higher grades--4, 5 and 6--reported that they had been bringing more articles, advertisements, and outside

information on nutrition into their classrooms. Fewer of the lower grade teachers reported doing so. However, some of these felt that since they were using the FYC curriculum, they had less time to devote to outside sources; they preferred to spend their time using FYC materials. At least half of the teachers reported talking more with other school personnel about nutrition education. None of the teachers reported decreasing the amount of time spent talking about nutrition.

We conclude that FYC changes in a positive direction the nutrition attitudes and behaviors of at least half of its teacher-users. In looking at the degree of change, we must remember that several of the teachers involved in the evaluation were already positively inclined toward nutrition education. Thus, no increase would be noted since their attitudes were already positive.

Costs. All activities in Levels 1, 2 and 3 which involved food preparation were tested and priced by level in a test kitchen in 1977. Teachers calculated their approximate actual costs to be compared to these test kitchen prices. Table 8 summarizes these data by level.

TABLE 8. Comparison of Two Sources of Estimated Costs for Implementing FYC.

<u>LEVEL</u>	<u>TEST KITCHEN</u>	<u>TEACHER</u>
1	\$14.00	\$19.84
2	13.87	11.13
3	22.62	15.09

Test kitchen costs and teacher costs for Levels 1 and 3 differ considerably. For Level 1 this may be due to change in costs of food and/or differential food costs across the country. For Level 3 this may be due to teachers not completing all the activities.

Teachers were asked how these additional expenses were met. Most teachers and schools shared responsibility for meeting the additional expenses. In a few cases students and parents helped, probably in donating foods and supplies. Several teachers suggested that information about cost be placed so that it may be easily found in the FYC teacher materials.

Synopsis

A summative evaluation study of the National Dairy Council's learning system, FOOD...Your Choice, was designed to answer three questions: effectiveness of FOOD...Your Choice in enhancing students' understanding of nutrition, effect of instruction in nutrition on student attitudes about nutrition and student behaviors in relation to food choices, and effect of a new curriculum upon the ongoing instructional program in the schools.

Results indicated that FYC did significantly increase students' nutrition knowledge, even when the effects of prior knowledge, maturation, site, sex and ability level were removed. All teachers provided examples of the effects of FYC on students' attitudes about good nutrition and

on observable student behaviors concerning food choices. Students chose more nutritious snacks and ate more nutritious foods at lunch. They more frequently discussed nutrition in relation to what they ate and better understood the relation between food and health. Learning environment, as perceived by students, did not appear to be changed by the FYC curriculum. In all but one instance, teachers fit the existing curriculum around FYC instead of selecting activities from FYC only when they fit the existing curriculum. Many nutrition activities were found amenable to integration into the regular time plan. Teachers found they could implement activities in less time than the maximum suggested in the Teachers' Guide. In sum, the learning system for nutrition education at the elementary school level, FOOD...Your Choice, is effective in enhancing nutrition knowledge and improving food choice behaviors and is easy to implement.

Notes

1. Eash, M. J. and Rasher, S. P. A needs assessment of nutrition education. Rosemont, Illinois: National Dairy Council. cl976.
2. Go, C. An analysis of selected curriculum guides used for nutrition education in grades K-12. Berkeley, California: Society for Nutrition Education. cl976.
3. Cooper, K. A. and Go, C. E. Analysis of nutrition curriculum guides at the K-12 level. Journal of Nutrition Education, 8:2, (April-June, 1976), pp. 62-66.
4. White House conference on food, nutrition and health: Final report. Washington, D.C.: U.S. Government Printing Office. 1970.
5. Eash, M. J., Talmage, H., Rasher, S. P., and Strachan, P. Report on the field tests of the National Dairy Council nutrition education, K-6. (Three volumes). Chicago, Illinois: Office of Evaluation Research, University of Illinois at Chicago Circle. 1977.
6. The Office of Evaluation Research (OER), University of Illinois, Chicago Circle conducted the study and prepared the final report and the executive summary. OER takes responsibility for all statements in these reports. This report has been reviewed by NDC staff and accepted in December 1978.
7. The number of teachers is greater than the number of classrooms due to team teaching arrangements in some of the classes.
8. Before OER could consummate the contract with the National Dairy Council, all instruments to be administered to human subjects were reviewed by the University Committee of Associates to assure ethical treatment of subjects and confidentiality of data collected.
9. Anderson, G. J. The assessment of learning environments: A manual for The Learning Environment Inventory and My Class Inventory. Halifax, Nova Scotia: Atlantic Institute of Education. 1971.
10. Steele, J. M., House E. R., Lapan, S., and Kerins, T. Instructional climate in Illinois gifted classes. Urbana, Illinois: Center for Instructional Research and Curriculum Evaluation, University of Illinois. 1970.